Minot Quadrangle, Maine

Surficial geologic mapping by
Carol T. Hildreth

Digital cartography by:
Robert A. Johnston

Robert G. Marvinney
State Geologist

Cartographic design and editing by:
Robert D. Tucker

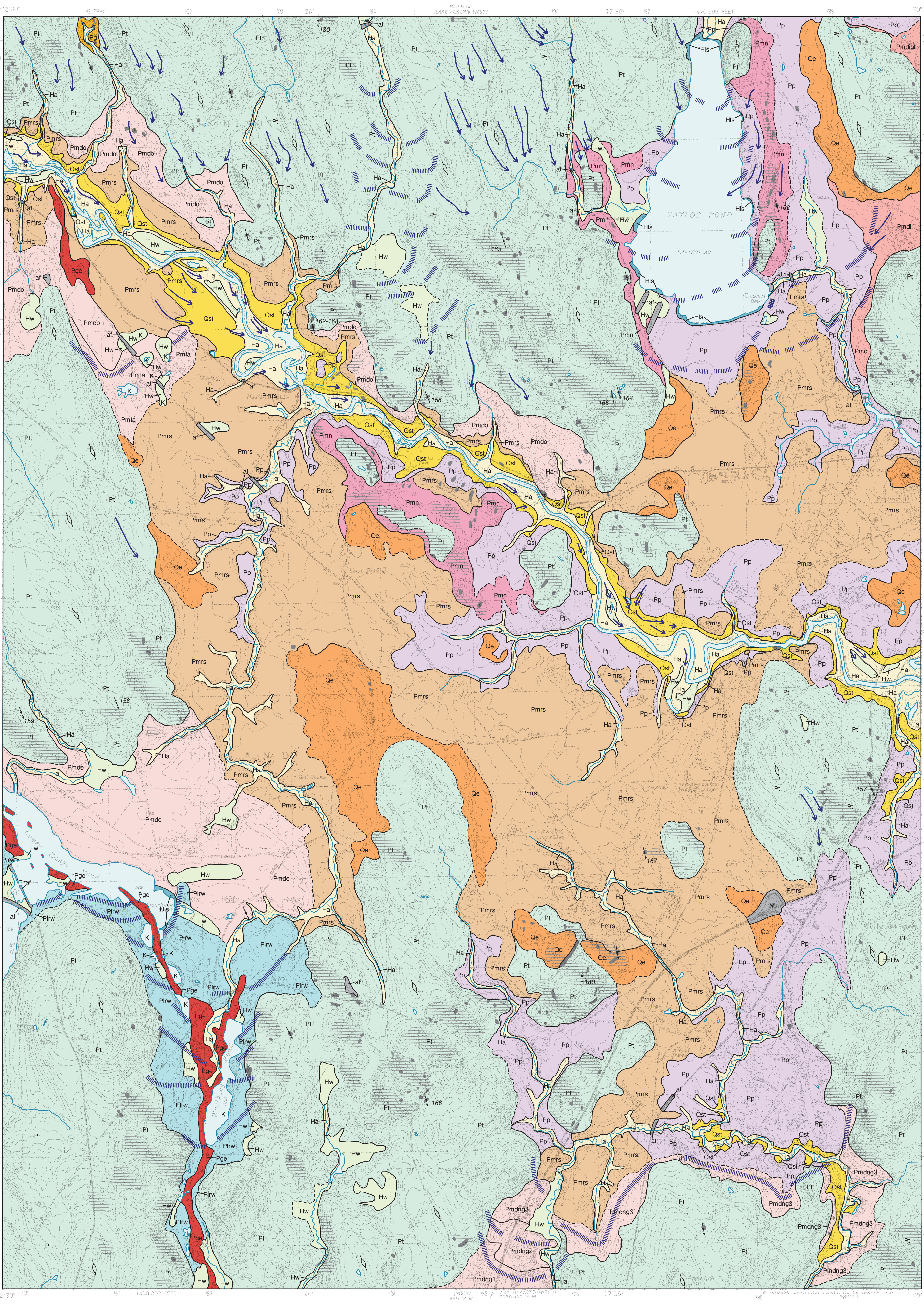
Funding for the preparation of this map was provided in part by the U. S. Geological Survey STATEMAP Program, Cooperative Agreement No. 00HQAG007.

Maine Geological Survey
Address: 22 State House Station, Augusta, Maine 04333
Telephone: 207-287-2801 **E-mail:** mgs@maine.gov
Home page: http://www.maine.gov/doc/nrimc/nrimc.htm

Open-File No. 02-231
2002

For additional information, see Open-File Report 01-481.

Surficial Geology



SOURCES OF INFORMATION

Surficial geologic mapping of the Minot quadrangle was conducted by Carol T. Hildreth during the 2000 field season. Funding for this work was provided by the U. S. Geological Survey STATEMAP program and the Maine Geological Survey, Department of Conservation.

Quadrangle Location

SCALE 1 : 24,000

1 MILE — 1000 0 1000 2000 3000 4000 5000 6000 7000 FEET — 1 KILOMETER

CONTOUR INTERVAL 10 FEET

TRUE NORTH

Topographic base from U.S. Geological Survey Minot quadrangle, scale 1:24,000 using standard U.S. Geological Survey topographic map symbols.

The use of industry, firm, or local government names on this map is for location purposes only and does not impute responsibility for any present or potential effects on the natural resources.

NOTE: A very thin, discontinuous layer of windblown sand and silt, generally mixed with underlying glacial deposits by frost action and bioturbation, is present near the ground surface over much of the map area but is not shown.

af — **Artificial fill** - Man-made. May be composed of sand and gravel, till, quarry waste, or sanitary landfill; includes highway and railroad embankments. This material is mapped only where it can be identified using the topographic contour lines. Minor artificial fill is present in virtually all developed areas of the quadrangle. Thickness of fill varies.

Ha — **Stream alluvium** (Holocene) - Sand, silt, gravel, and muck in flood plains along present rivers and streams. As much as 3 m (10 ft) thick. Extent of alluvium indicates most areas flooded in the past that may be subject to future flooding. In places, this unit is indistinguishable from, grades into, or is interbedded with freshwater wetlands deposits (Hw), especially in the Little Androscoggin and Royal River flood plains and their larger tributaries.

Hw — **Freshwater wetland deposit** (Holocene) - Muck, peat, silt, and sand. Generally 0.5 to 3 m (1 to 10 ft) thick. In places, this unit is indistinguishable from, grades into, or is interbedded with stream alluvium (Ha), especially in the Little Androscoggin and Royal River flood plains and their larger tributaries.

Hls — **Modern lakeshore deposit** (Holocene) - Sand and/or gravel with silt in places. Developed along the present and prehistoric shorelines of lakes and ponds. 0.5 to 2 m (1 to 6 ft) thick. Includes spit deposits.

Qst — **Stream terrace deposit** (Holocene and Late Pleistocene) - Sand, silt, gravel, and occasional muck on terraces cut into glacial deposits in the Little Androscoggin and Royal River valleys. These terraces formed in part during late-glacial time as sea level regressed. From 0.5 to 5 m (1 to 15 ft) thick.

Qe — **Eolian deposit** (Pleistocene) - Fine- to medium-grained, well-sorted sand. Found as small dunes on a variety of older glacial deposits. Deposited after late-glacial sea level regressed from the area and left many fine-grained marine sediments exposed to wind erosion and transport before vegetation established itself and anchored the deposits. Most are found blanketing the eastern sides of hills, which indicates they were deposited by prevailing westerly winds. Many more thin dunes are present in the area than are delineated on the map. Some dunes may have been active in postglacial time. Thickness varies from 0.5-8 m (1-25 ft).

Pmn — **Marine nearshore deposits** (Pleistocene) - Sand and gravel derived from reworking of glacial sediments by wave and current action. Deposited in marine shoreline and nearshore environments.

Pmrs — **Marine regressive sand deposits** (Pleistocene) - Sand and minor gravel. Consists of reworked marine delta and outwash materials graded by streams to falling sea level during late-glacial time. Thickness as much as 3 m (10 ft) or more.

Pg — **Undifferentiated glaciofluvial deposits in Cool Brook valley** (Pleistocene) - Sand, silt, and gravel. Consists of thin glaciofluvial outwash and/or ice-contact deposits. Thickness varies; from 0 to 3 m (0-10 ft).

Pmfa — **Glaciomarine fan deposits of the Little Androscoggin River valley** (Pleistocene) - Sand, silt, gravel, and mud. Consists of subaqueous fan and outwash deposits graded to the contemporary sea. In places, overlain by unmapped thin dune deposits. Thickness varies: 0.5 to 30 m (1 - 100 ft).

Pmdo — **Glaciomarine delta deposits** (Pleistocene) - Sand, silt, gravel, and mud. Consists of delta deposits graded to the contemporary sea. In places, overlain by unmapped thin dune deposits. Thickness varies: 0.5 to 12 m (1-40 ft).

Pmdi — **Glaciomarine ice-contact delta deposits** (Pleistocene) - Composed primarily of sorted and stratified sand and gravel. Consists of ice-contact delta deposits graded to the contemporary sea. Distinguished by flat top (sometimes kettled) and foreset-topset beds. Thickness varies from 0.5 to 30 m (1 to 100 feet). One delta has been assigned the unique geographic name listed below:

Pmdigl - Gracelawn delta; topset-foreset contact at elevation 336 feet (102 m). (Thompson and others, 1989)

Pmdng — **Glaciofluvial and glaciomarine deposits of the New Gloucester area** (Pleistocene) - Sand, silt, gravel, and mud. Consists of delta and subaqueous fan deposits graded to the contemporary sea immediately south of the quadrangle (Pmdng1 and 2). The youngest deposit in this sequence, Pmdng3, was graded to a gap in the hills where the Royal River exits the quadrangle to the south. In places, overlain by unmapped thin dune deposits. Thickness varies: 0.5 to 30 m (1-100 ft).

Pp — **Presumpscot Formation: Glaciomarine bottom deposits** (Pleistocene) - Silt and clay with local sandy beds and lenses. Consists of late-glacial fine-grained (marine mud) sea-floor deposits. Commonly lies beneath surface deposits of units Pmdo or Pmrs; in places, may be overlain by unmapped thin dune deposits. As much as 20 m (66 ft) thick.

Plrw — **Glaciolacustrine deposits of the Lower Range and Worthley Ponds area** (Pleistocene) - Predominantly sand and gravel laid down in contact with and beyond glacial ice as kame-delta, subaqueous fan, and lake-bottom deposits graded to the southeast over ice and drift dams in the Worthley Pond basin. As much as 29 m (96 ft) thick, but generally less than 21 m (70 ft) thick.

Pge — **Esker deposits** (Pleistocene) - Sand and gravel deposited by glacial meltwater flowing in tunnels within or beneath the ice. As much as 21 m (70 ft) thick.

Pt — **Till** (Pleistocene) - Light- to dark-gray, nonsorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders; a predominantly sandy diamicton containing some gravel. Generally underlies most other deposits. Thickness varies and generally is less than 6 m (20 ft), but is probably more than 30 m (100 ft) under many drumlins and streamlined hills. Many streamlined hills in this area are bedrock-cored.

Bedrock exposures - Not all individual outcrops are shown on the map. Gray dots indicate individual outcrops; ruled pattern indicates areas of abundant exposures and areas where surficial deposits are generally less than 3 m (10 ft) thick. Mapped in part from aerial photography, soil surveys (Hedstrom, 1974; McEwen, 1970), and previous geologic maps (Hanley, 1959; Prescott, 1968).

Contact - Boundary between map units. Dashed where very approximate.

Channel eroded by glacial meltwater or meteoric water flow over outwash or till deposit. Arrow indicates direction of flow.

135 — Glacial striation. Point of observation is at dot. Number indicates azimuth (in degrees) of former ice-flow direction.

Drumlin form or streamlined hill. Symbol is parallel to direction of glacial ice movement.

Inferred approximate ice-frontal position at time of deposition of meltwater deposits.

K — Kettle hole - depression left by melting of glacial ice.

REFERENCES

Hanley, J. B., 1959, Geologic map of the Poland quadrangle, Maine [surficial geology]: U. S. Geological Survey, Geologic Quadrangle Map, GQ-120, scale 1:62,500.

Hedstrom, G., 1974, Soil survey of Cumberland County, Maine: U.S. Department of Agriculture, Soil Conservation Service Soil Survey, 94 p.

McEwen, B. W., 1970, Soil survey of Androscoggin and Sagadahoc Counties, Maine: U. S. Department of Agriculture, Soil Conservation Service, 83 p., scale 1:15,840.

Prescott, G. C., Jr., 1968, Ground-water favorability areas and surficial geology of the lower Androscoggin River basin, Maine: U. S. Geological Survey, Hydrologic Investigations Atlas, HA-285, scale 1:62,500.

USES OF SURFICIAL GEOLOGY MAPS

A surficial geology map shows all the loose materials such as till (commonly called hardpan), sand and gravel, or clay, which overlie solid ledge (bedrock). Bedrock outcrops and areas of abundant bedrock outcrops are shown on the map, but varieties of the bedrock are not distinguished (refer to bedrock geology map). Most of the surficial materials are deposits formed by glacial and deglacial processes during the last stage of continental glaciation, which began about 25,000 years ago. The remainder of the surficial deposits are the products of postglacial geologic processes, such as river floodplains, or are attributed to human activity, such as fill or other land-modifying features.

The map shows the areal distribution of the different types of glacial features, deposits, and landforms as described in the map explanation. Features such as striations and moraines can be used to reconstruct the movement and position of the glacier and its margin, especially as the ice sheet melted. Other ancient features include shorelines and deposits of glacial lakes or the glacial sea, now long gone from the state. This glacial geologic history of the quadrangle is useful to the larger understanding of past earth climate, and how our region of the world underwent recent geologically significant climatic and environmental changes. We may then be able to use this knowledge in anticipation of future similar changes for long-term planning efforts, such as coastal development or waste disposal.

Surficial geology maps are often best used in conjunction with related maps such as surficial materials maps or significant sand and gravel aquifer maps for anyone wanting to know what lies beneath the land surface. For example, these maps may aid in the search for water supplies, or economically important deposits such as sand and gravel for aggregate or clay for bricks or pottery. Environmental issues such as the location of a suitable landfill site or the possible spread of contaminants are directly related to surficial geology. Construction projects such as locating new roads, excavating foundations, or siting new homes may be better planned with a good knowledge of the surficial geology of the site. Refer to the list of related publications below.

OTHER SOURCES OF INFORMATION

1. Hildreth, C. T., 2001, Surficial geology of the Minot 7.5' quadrangle, Maine: Maine Geological Survey, Open-File Report 01-481.
2. Locke, D. B., and Hildreth, C. T., 2001, Surficial materials of the Minot quadrangle, Maine: Maine Geological Survey, Open-File Map 01-483.
3. Neil, C. D., 1999, Significant sand and gravel aquifers of the Minot quadrangle, Maine: Maine Geological Survey, Open-File Map 99-21.
4. Thompson, W. B., 1979, Surficial geology handbook for coastal Maine: Maine Geological Survey, 68 p. (out of print).
5. Thompson, W. B., and Borns, H. W., Jr., 1985, Surficial geologic map of Maine: Maine Geological Survey, scale 1:500,000.
6. Thompson, W. B., Crossen, K. J., Borns, H. W., Jr., and Andersen, B. G., 1989, Glaciomarine deltas of Maine and their relation to late Pleistocene-Holocene crustal movements, *in* Anderson, W. A., and Borns, H. W., Jr. (eds.), Neotectonics of Maine: Maine Geological Survey, Bulletin 40, p. 43-67.